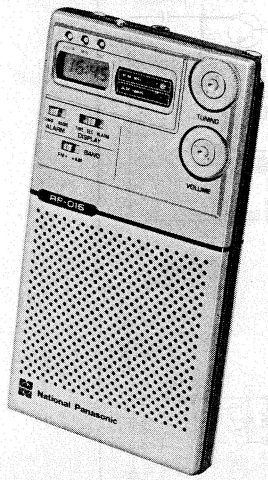
ORDER NO. RD7802-1560

Service Manual

Radio

FM-AM PORTABLE RADIO WITH QUARTZ CLOCK

RF-016



■ SPECIFICATIONS

Frequency Range:	FM 87.5～108 MHz
	MW 520～1610 kHz (577～186m)
Intermediate Frequency:	FM 10.7 MHz
	AM 455 kHz
Sensitivity:	FM 2μV for 50mW Output
	AM 100μV/m for 50mW Output
Power Output:	120mW Maximum
Batteries:	Radio: 3V (two "AAA" Size Batteries) (National UM-4 or equivalent)
	Clock: 1.5V (One Silver Oxide Battery)
Speaker:	4.5 cm ($1\frac{1}{2}$") PM Dynamic Speaker
Dimensions:	75(Wide) × 138(High) × 17.3(Deep)mm ($2\frac{3}{4}$" × $5\frac{7}{16}$" × $\frac{11}{16}$")
Weight:	180g. (6.4 oz.) with batteries
Impedance:	Speaker 8Ω
	Earphone Jack 8Ω

Specifications are subject to change without notice for further improvement.

■ TO REMOVE CABINET COVER

1. Remove the battery (Radio) cover.
2. Remove the batteries.
3. Remove 1 screw for the cabinet cover, as shown in fig. 1.
4. Remove the catch in the direction of arrow, as shown in fig. 2.
5. Remove the catch in the direction of arrows, as shown in fig. 3.
6. Remove the catch in the direction of arrow① and remove the cabinet cover in the direction of arrow②, as shown in fig. 4.
7. To remove the cabinet cover completely unsolder lead from telescopic antenna.
8. To reassemble, reverse the above procedure.

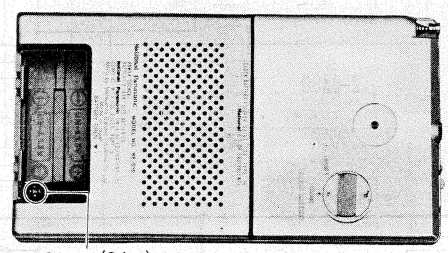


Fig. 1

■ TO REMOVE PC BOARD

1. Remove the cabinet cover.
2. Remove the tuning and volume controls knobs, by removing 2 screws (nos. 1 & 2) by rotating them counterclockwise. In the absence of a special tool for this purpose, you may use a pair of tweezers, or two small brads appropriately spaced in a short length of wood dowel, see fig. 5.
3. Remove 2 screws (nos. 1 & 2) as shown in fig. 6.
4. Push the catch in the direction of arrow, as shown in fig. 6.
5. Remove the battery terminal.
6. To reassemble, reverse the above procedure.

■ TO REMOVE VOLUME CONTROL

1. Remove the PC board. (Refer to PC board removal instruction.)
2. Remove solder from control, at 5 points, by using solder sucker.
3. Remove the control.
4. To reassemble, reverse the above procedure and note the following.

Note: Be sure that the volume control terminals are flush with the circuit board when soldering them into place. If not, the control knob may not clear the front cover properly.

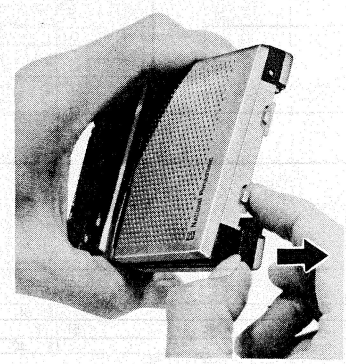


Fig. 2

National Panasonic

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka, Japan

■ TO MOUNT TUNING CAPACITOR

1. Mount the tuning knob shaft to tuning capacitor.
2. Mount the dial scale to tuning capacitor.
3. Fix 2 screws (nos. 1 & 2) temporarily, as shown in fig. 7.
4. Mount the tuning knob.
5. Check rub between knob and cabinet. Then, secure two screws, as shown in fig. 7.
6. Insert the tuning capacitor terminals in the hole of PC board. Then solder the tuning capacitor terminals.

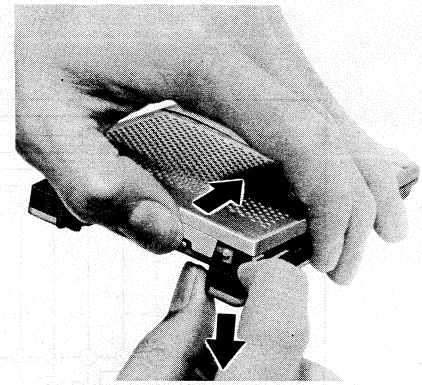


Fig. 3

■ TO REPLACE CHIPS (Resistor, Capacitor, Jumper)

1. Remove solder from chip by using a solder sucker.
2. Remove the chip by wiggling it with a pair of tweezers while removing solder, as shown in fig. 8.

Notes:

1. Do not reuse a chip which is removed from the circuit board.
2. When replacing a chip jumper, use a small length of insulated wire, instead of a new chip jumper.
3. Do not heat chips more than three (3) seconds.
4. Be careful not to damage the chips' electrodes.
5. Use soldering iron (less than 60W) and tweezers to remove and replace chips.

Color	Chips
Black	Resistor
Brown	Capacitor
Blue	Jumper

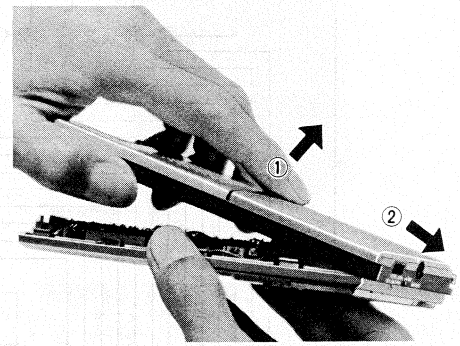


Fig. 4

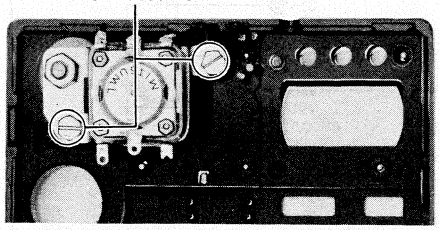


Fig. 7

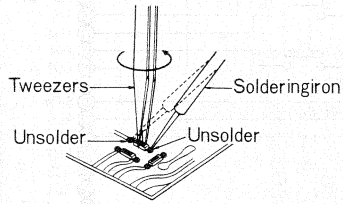


Fig. 8

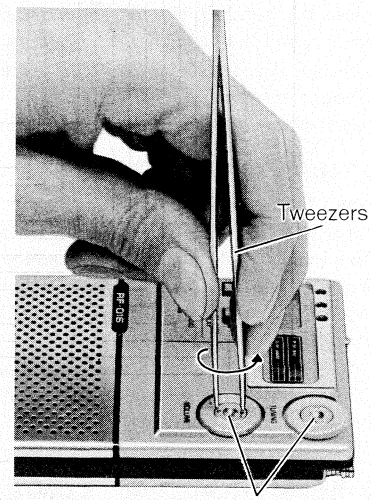


Fig. 5

■ ALIGNMENT POINTS

Note: Please refer to Circuit Board Wiring View which is located test points.

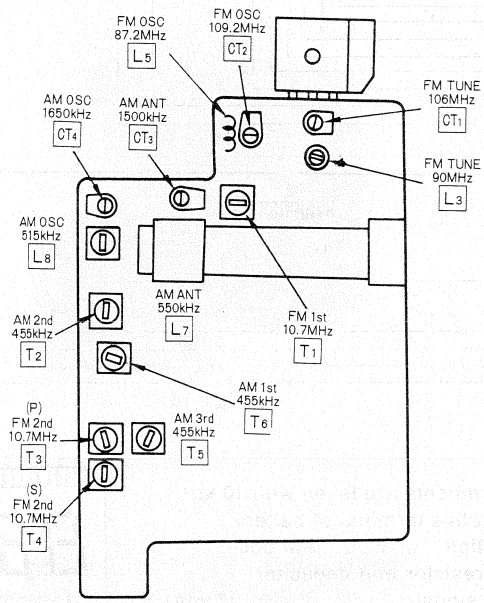

FM OSC 87.2MHz L5
FM OSC 109.2MHz CT2
AM OSC 1650kHz CT4
AM ANT 1500kHz CT3
FM TUNE 106MHz CT1
FM TUNE 90MHz L3
AM OSC 515kHz L8
AM ANT 550kHz L7
FM 1st 10.7MHz T1
AM 2nd 455kHz T2
AM 1st 455kHz T6
(P) FM 2nd 10.7MHz T3
AM 3rd 455kHz T5
(S) FM 2nd 10.7MHz T4

Fig. 9

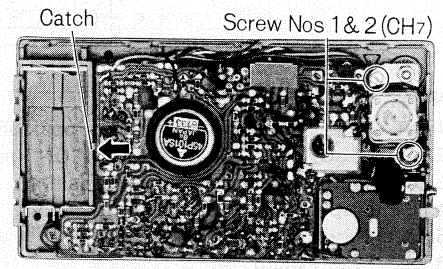
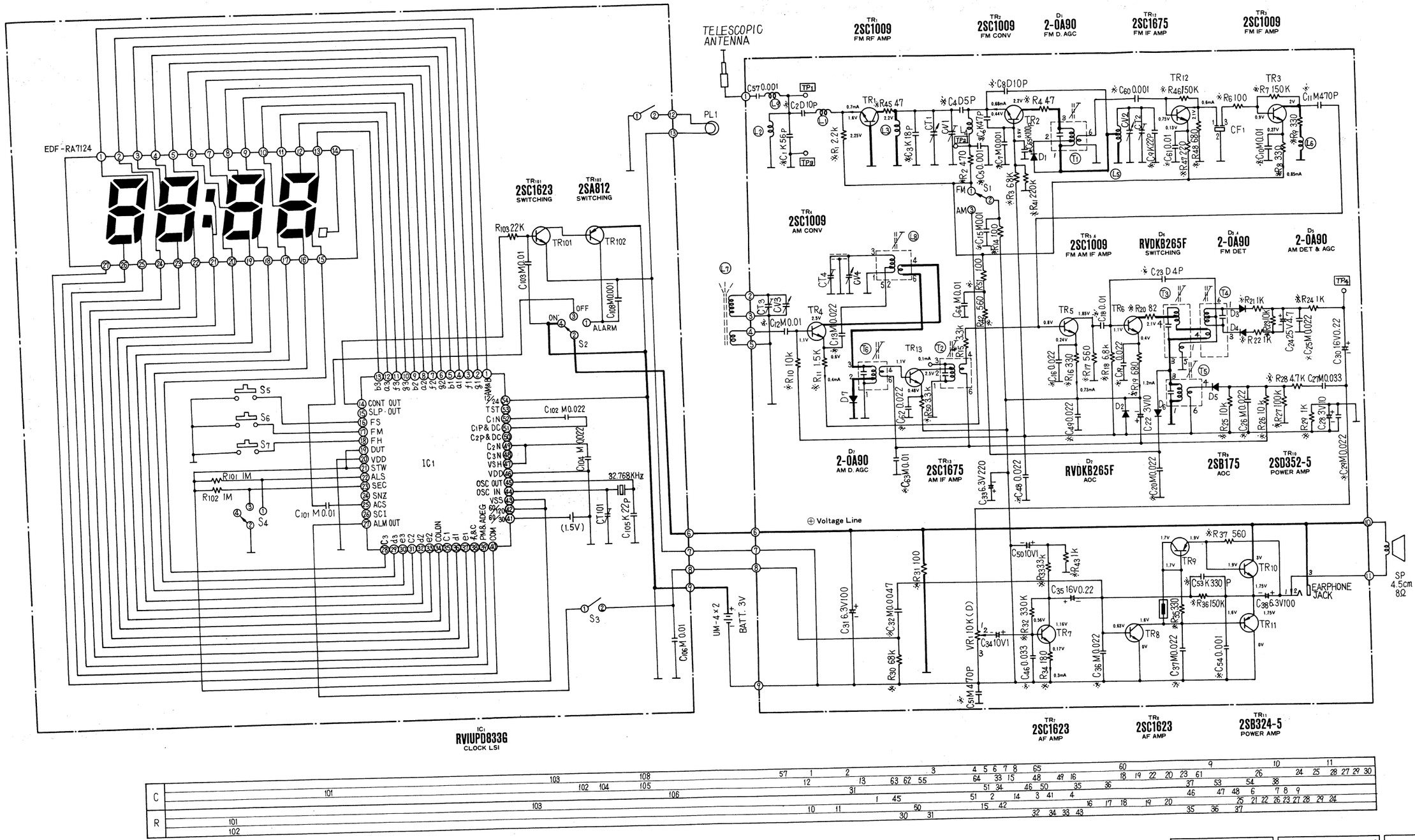


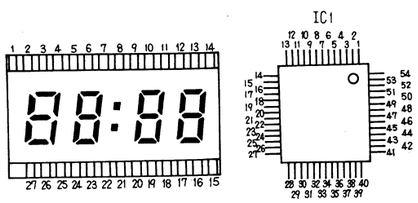
Fig. 6

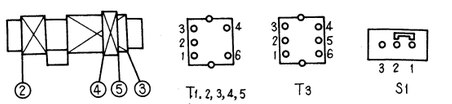
Schematic Diagram – Model RF-016

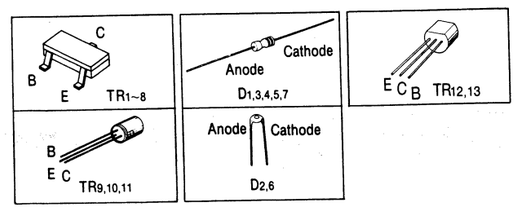


Note:

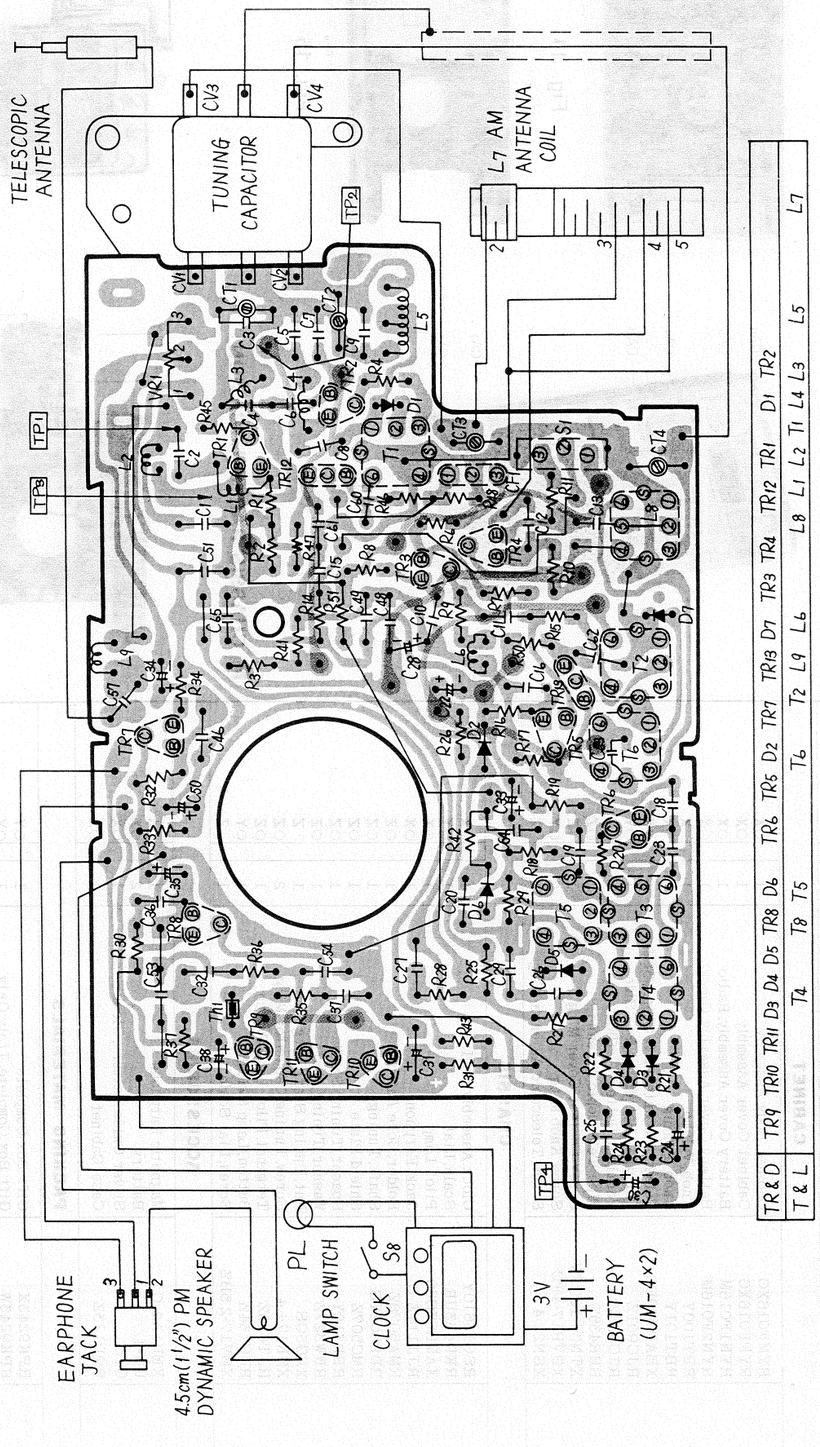
1. S_{1-1}, S_{1-2}: Band switch in "FM" position.
2. S_2: ON-OFF-ALARM selector in "ON" position.
3. S_3: Alarm switch in "RADIO" position.
4. S_4: Display switch in "TIME" position.
5. S_5: Second switch.
6. S_6: Hour switch.
7. S_7: Minute switch.
8. S_8: Lamp switch.
9. DC voltage measurements are taken with 10 kΩ/V voltmeter from negative terminal of battery.
   $TR_{1\sim3,12}$...FM position $TR_{4,13}$...AM position
10. ※mark.....Chip resistor and capacitor.
11. Battery current No signal .....17 mA
    Maximum Output .....58 mA







Circuit Board Wiring View–Model RF-016



TR13		AM
	C	2.5V
	B	1.1V
	E	0.48V
	I_E	0.1mA

TR12		FM
	C	2.1V
	B	0.75V
	E	0.13V
	I_E	0.6mA

TR11		
	C	0V
	B	1.6V
	E	1.75V

TR10		
	C	3V
	B	1.9V
	E	1.75V

TR9		
	C	1.6V
	B	0.63V
	E	0V

TR8		
	C	1.7V
	B	1.7V
	E	1.9V

TR7		
	C	1.16V
	B	0.56V
	E	0.17V
	I_E	0.3mA

TR6		
	C	2.1V
	B	1.1V
	E	0.4V
	I_E	1.2mA

TR5		
	C	1.85V
	B	0.8V
	E	0.24V
	I_E	0.73mA

TR4		AM
	C	2.5V
	B	1.1V
	E	0.6V
	I_E	0.4mA

TR3		FM
	C	2V
	B	0.9V
	E	0.27V
	I_E	0.65mA

TR2		FM
	C	2.2V
	B	0.9V
	E	0.44V
	I_E	0.68mA

TR1		FM
	C	2.2V
	B	2.25V
	E	1.6V
	I_E	0.7mA

■ ALIGNMENT INSTRUCTIONS

READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Notes:
1. Set volume control to maximum.
2. Set band selector switch to AM or FM.
3. Set power source voltage to 3 volts DC.
4. Signal generator output should be set no higher than necessary to obtain an output reading, to prevent overlooking.

	SIGNAL GENERATOR CONNECTIONS	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	INDICATOR (VTVM or SCOPE)	ADJUSTMENT	REMARKS
	AM-IF ALIGNMENT					
(1)	Fashion loop of several turns of wire and radiate signal into loop of receiver.	455 kHz 30% Mod. with 400 Hz.	Point of non-interference. (on/about 600 kHz)	Output meter across voice coil.	T_6 (1st IFT) T_2 (2nd IFT) T_5 (3rd IFT)	Adjust for maximum output.
	AM-RF ALIGNMENT					
(2)	〃	515 kHz	Tuning capacitor fully closed.	〃	L_8 (OSC Coil)	〃
(3)	〃	550 kHz	Tune to signal.	〃	(＊1)L_7 (ANT Coil)	Adjust for maximum output. Adjust L_7 by moving coil bobbin along ferrite core.
(4)	〃	1500 kHz	Tune to signal.	〃	CT_3 (ANT Trimmer)	Adjust for maximum output.
(5)	〃	1650 kHz	Tuning capacitor fully open.	〃	CT_4 (OSC Trimmer)	Adjust for maximum output. Repeat steps (2)～(5).
	(＊1) Cement antenna bobbin in place with wax after completing alignment.					
	FM-IF ALIGNMENT					
(6)	High side thru. 0.001μF to point TP2, Negative side to point TP3.	10.7 MHz (400 kHz SWP.)	Point of non-interference. (on/about 90 MHz).	Connect vert. amp. of scope to point TP4, Negative side to point TP3.	T_1 (FM 1st IFT) T_3 (FM 2nd IFT) (Primary)	Adjust for maximum amplitude. (Refer to fig. 10).
(7)	〃	〃	〃	〃	T_4 (FM 2nd IFT) (Secondary)	Adjust for maximum amplitude. (Refer to fig. 11).
	FM-RF ALIGNMENT					
(8)	Connect point TP1 through FM dummy antenna Negative side to Point TP3. (Refer to fig. 12.)	87.2 MHz	Tuning capacitor fully closed.	Output meter across voice coil.	L_5 (OSC Coil)	(＊2) Adjust for maximum output.
(9)	〃	90 MHz	Tune to signal.	〃	L_3 (Tuning Coil)	〃
(10)	〃	106 MHz	Tune to signal.	〃	CT_1 (Tuning Trimmer)	〃
(11)	〃	109.2 MHz	Tuning capacitor fully open.	〃	CT_2 (OSC Trimmer)	(＊2) Adjust for maximum output. Repeat steps (8)～(11).
	(＊2) Three output responses will be present; proper tuning is the center frequency.					

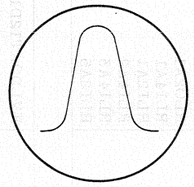


Fig. 10

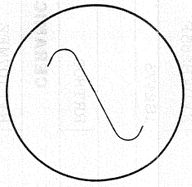


Fig. 11

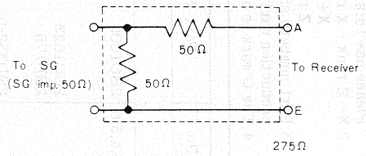


Fig. 12 FM Dummy Antenna

■REPLACEMENT PARTS LIST·····Model RF-016

(RD7802-1560)

NOTES: 1. Part numbers are indicated on most mechanical parts.
Please use this part number for parts orders.
2. **X**—**Z** rank : **X** rank parts will cover 80% of repair needs.
X+**Y** rank parts will cover 95% of repair needs.
Z rank parts are less necessary.
3. Part numbers shown in bold letters are service standard parts and may differ from production parts.
4. The ○ mark is used by the manufacturing plant only.

Ref. No.	Part No.	Part Name & Description	Per Set		Remarks
		TRANSISTORS AND DIODES			
TR1,2,3,4,5,6	2SC1009	Transistor (Si), FM RF Amp., FM CONV., FM IF Amp., AM CONV., FM, AM IF Amp.	6		X
TR7,8	2SC1623	Transistor (Si), AF Amp.	2		X
TR9	2SB175	Transistor (Ge), Operation Compensator	1		X
TR10	2SD352-5	Transistor (Si), Power Amp.	1		X
TR11	2SB324	Transistor (Ge), Power Amp.	1		X
TR12,13	2SC1675	Transistor (Si), FM/AM IF Amp.	2		X
D1,3,4,5	**2-0A90**	Diode (Ge), FM AGC, FM DET., AM DET. & AGC	4		X
D2,6	RVDKB265F	Diode (Si), Operation Compensator, Switching	2		X
D7	1S2473	Diode (Si), AM D.AGC	1		X
		THERMISTOR			
Th	RRT800	Temperature Compensator	1		X
		CERAMIC FILTER, COILS AND TRANSFORMERS			
CF1	RVF107MFZ	Ceramic Filter	1		○X
L3	RLO4N91	Antenna Coil, FM	1		○X
L5	RLO4Y43	Oscillator Coil, FM	1		X
L7	RLF2I46	Antenna Coil, AM	1		X
L8	RLO2A1	Oscillator Coil, AM	1		X
T1	RLI4A1	IFT, FM	1		X
T2,6	RLI2A1	IFT, AM	2		X
T3	RLI4A2	IFT, FM	1		X
T4	RLI4A3	IFT, FM	1		X
T5	RLI2A5	IFT, AM	1		○X
		VARIABLE RESISTOR			
VR1	EVLDOAT12D14	Variable Resistor, 10KΩ (D), Volume Control	1		○X
		VARIABLE CAPACITOR			
CV1,2,3,4	RCVNPCLC416	Tuning Capacitor	1		X
CT1,2,3,4	ECV1ZW10X53D	Trimmer Capacitor	4		X

Ref. No.	Part No.	Part Name & Description	Per Set		Remarks
		SPEAKER			
SP	EAS45P103S	Speaker, Imp. 8Ω, 4.5cm (1½″), PM Dynamic	1		X
		SWITCH			
S1	RSS2A10Z-F	Switch, Band	1		○X
		RESISTORS			
R4,45	RRD18XK470	47Ω, ¼Watt, ±10%, Chip	2		Z
R20	RRD18XK820	82Ω, ¼Watt, ±10%, Chip	1		Z
R6,14,31,51	RRD18XK101	100Ω, ¼Watt, ±10%, Chip	4		Z
R34	RRD18XK181	180Ω, ¼Watt, ±10%, Chip	1		Z
R47	RRD18XK221	220Ω, ¼Watt, ±10%, Chip	1		Z
R8,9,16,35	RRD18XK331	330Ω, ¼Watt, ±10%, Chip	4		Z
R2	RRD18XK471	470Ω, ¼Watt, ±10%, Chip	1		Z
R17,37,42	RRD18XK561	560Ω, ¼Watt, ±10%, Chip	3		Z
R19,48	RRD18XK681	680Ω, ¼Watt, ±10%, Chip	2		Z
R21,22,24,29,43	RRD18XK102	1KΩ, ¼Watt, ±10%, Chip	5		Z
R11	RRD18XK152	1.5KΩ, ¼Watt, ±10%, Chip	1		Z
R1	RRD18XK222	2.2KΩ, ¼Watt, ±10%, Chip	1		Z
R15,33,50	RRD18XK332	3.3KΩ, ¼Watt, ±10%, Chip	3		Z
R28	RRD18XK472	4.7KΩ, ¼Watt, ±10%, Chip	1		Z
R18	RRD18XK682	6.8KΩ, ¼Watt, ±10%, Chip	1		Z
R10,23,25,26	RRD18XK103	10KΩ, ¼Watt, ±10%, Chip	4		Z
R3,30	RRD18XK683	68KΩ, ¼Watt, ±10%, Chip	2		Z
R27	RRD18XK104	100KΩ, ¼Watt, ±10%, Chip	1		Z
R7,36,46	RRD18XK154	150KΩ, ¼Watt, ±10%, Chip	3		Z
R41	RRD18XK224	220KΩ, ¼Watt, ±10%, Chip	1		Z
R32	RRD18XK334	330KΩ, ¼Watt, ±10%, Chip	1		Z
		CAPACITORS			
C23	ECUX1H040DC	4PF, 50WV, ±0.5PF, Chip	1		Z
C4	ECUX1H050DC	5PF, 50WV, ±0.5PF, Chip	1		Z
C2,8	ECUX1H100KC	10PF, 50WV, ±10%, Chip	2		Z
C3	ECUX1H180KC	18PF, 50WV, ±10%, Chip	1		Z
C9	ECUX1H220KC	22PF, 50WV, ±10%, Chip	1		Z
C6	ECUX1H470KC	47PF, 50WV, ±10%, Chip	1		Z
C1	ECUX1H560KC	56PF, 50WV, ±10%, Chip	1		Z
C46	ECUX1H333ZF	0.033μF, 50WV, +80 −20 %, Chip	1		Z
C65	ECUX1H101KD	100PF, 50WV, ±10%, Chip	1		Z
C53	ECUX1H331KD	330PF, 50WV, ±10%, Chip	1		Z
C11,51	ECUX1H471MD	470PF, 50WV, ±20%, Chip	2		Z
C5,54,60	ECUX1H102ZF	0.001μF, 50WV, +80 −20 %, Chip	3		Z
C7	ECUX1H102MD	0.001μF, 50WV, ±20%, Chip	1		Z
C32	ECUX1H472MD	0.0047μF, 50WV, ±20%, Chip	1		Z
C18,61	ECUX1H103ZF	0.01μF, 50WV, +80 −20 %, Chip	2		Z
C10,12,15,63,	ECUX1H103MD	0.01μF, 50WV, ±20%, Chip	4		Z
C16,19,48,49,62	ECUX1H223ZF	0.022μF, 50WV, +80 −20 %, Chip	5		Z
C13,20,25,26,29,36,37	ECUX1H223MD	0.022μF, 50WV, ±20%, Chip	7		Z

Ref. No.	Part No.	Part Name & Description	Per Set		Remarks
		CABINET			
CA1	RYMF016XG	Cabinet Body Assembly	1		○X
CA2	RYFF016XG	Cabinet Cover Assembly	1		○X
	RYN1F016M	Battery Cover Assembly, Radio	1		○X
CA3	RYN2F016M	Battery Cover Assembly, Clock	1		○X
CA4	RBT100Y	Knob, Volume	1		X
CA5	RBT101Y	Knob, Tuning	1		X
CA6	XEARS79EC-Y	Telescopic Antenna 5-Steps, 322mm	1		○X
CA7	RJC901Z	Terminal, Battery ⊕ & ⊖ Side	1		○Y
CA8	RJC903Z	Terminal, Battery ⊖ Side	1		○Y
CA9	RHR436Z	Pipe, Telescopic Antenna	1		○Z
CA10	XTN3+10CFV	Screw, Cabinet Cover M'tg	1		Z
CA11	XSVR17-4FC	Screw, Knob M'tg	2		○Y
	XSN2+4	Screw, Telescopic Antenna M'tg	1		Z
		CHASSIS			
	RSC1361 0Y	Clock Assembly (24H)	1		○X
CH1	RKD463UR	Scale, Dial	1		○Y
CH2	XAMR63S30	Pilot Lamp	1		○X
CH3	RJJ114Z-C	Jack, Earphone	1		○X
CH4	RMA5078Z	Holder, Core Antenna	1		○Z
CH5	RDF805YS	Shaft, Tuning	1		○Z
CH6	RMC507Z	Shield Plate	1		○Z
	RHR318Y	Spacer, Tuning Shaft	1		○Z
	RNW327Z	Washer, Tuning Shaft	1		○Z
	XNG3CS	Nut, Tuning Shaft M'tg	1		Z
CH7	XSN17+4	Screw, Tuning Capacitor M'tg	2		○Z
CH8	RJT620Z	Terminal, Pilot Lamp Switch	1		○Z
CH9	RBC134Z	Button, Lamp Switch	1		○Y
CH10	XSV17-2.5BZ	Screw, Dial Scale	1		Z
		ACCESSORIES			
	XEH1A2-C	Magnetic Earphone	1		X
	UM-4	Battery	2		○X
	G13	Silver Oxide Battery, Clock	1		○X
	RQD123Z	Case, Cabinet	1		○X
		PACKING MATERIALS			
	RPK9243X	Gift Box Complete	1		○Y
	RPK9243W	Gift Box Complete, Italy Only	1		○Y
	(Not Available, Order RPK9243X or RPK9243W)	Gift Box	(1)		
		Sleeve	(1)		
		Accessories Box	(1)		
		Pad Case	(1)		

Ref. No.	Part No.	Part Name & Description	Per Set		Remarks
	RQX6216Z	Instruction Book	1		○Y
	XZB10X20A04	Polyethylene Cover	1		Z
	RPN259Z	Pad, Upper Side	1		○Z
	RPH307Z	Soft Cover	1		○Z

■ CABINET PARTS LOCATIONS

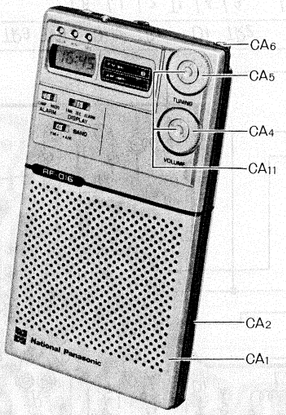


Fig. 13

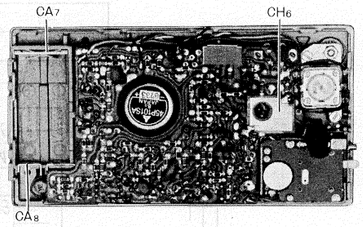


Fig. 14

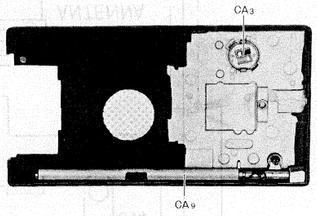


Fig. 15

■ CHASSIS PARTS LOCATION

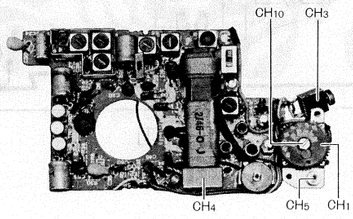


Fig. 16

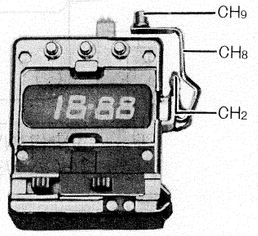


Fig. 17